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FLOOD INSURANCE STUDY

VILLAGE OF BEECHER, ILLINOIS

WILL COUNTY

APRIL 15, 1982

Federal Emergency Management Agency

COMMUNITY NUMBER - 170696

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PUBLISHED SEPARATELY:

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FLOOD INSURANCE STUDY

VILLAGE OF BEECHER,
WILL COUNTY, ILLINOIS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Beecher, Will County, Illinois, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the Village of Beecher to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Alfred Benesch and Company for the Federal Emergency Management Agency, under Contract No. H-4714. This study was completed in May 1981.

1.3 Coordination

The designation of areas requiring detailed study was completed in an initial coordination meeting on April 7, 1978, attended by representatives of the Village of Beecher, the Study Contractor, FEMA, the Illinois Division of Water Resources and the Will County Regional Planning Commission. The meeting was held at the Will County courthouse in Joliet, Illinois. On October 11, 13 and 18, 1978, a legal notice was published in the Beecher Herald announcing the intent to perform a flood elevation study for the Village of Beecher.

On November 9, 1981, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Beecher, Will County, Illinois. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction for the next five years, through May 1986.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Beecher.

Floods caused by the overflow of Trim Creek and Trim Creek Tributary were studied in detail. A small ponding area on the southwest corner of the Beecher corporate boundary was studied by approximate methods. Since the area was less than 25 acres, it was not shown. Also, a small area in the vicinity of Miller Street was studied by approximate methods.

2.2 Community Description

The Village of Beecher is located in southeastern Will County in northeastern Illinois, approximately 37 miles from downtown Chicago. The community area is 1.4 square miles and is completely surrounded by unincorporated Will County. The population in 1970 was 1,770. The population estimate in 1975 was 2,212, which represents an increase of 25 per cent over five years (Reference 1). Beecher is a rural community in a primarily agricultural area.

The climate of the area is best described as humid continental with warm to hot summers and moderately cold winters (Reference 2). The seasons are markedly distinct and, in general, lag three to five weeks behind the solstices. The proximity of Lake Michigan to the study area has a moderating effect on the climate. The average annual temperature is about 51 degrees Fahrenheit (F.). Average monthly temperatures vary from 24 degrees F. in January to 74 degrees F. in July, with daily extremes ranging from -25 degrees F. to 110 degrees F. The average annual temperature by month is:

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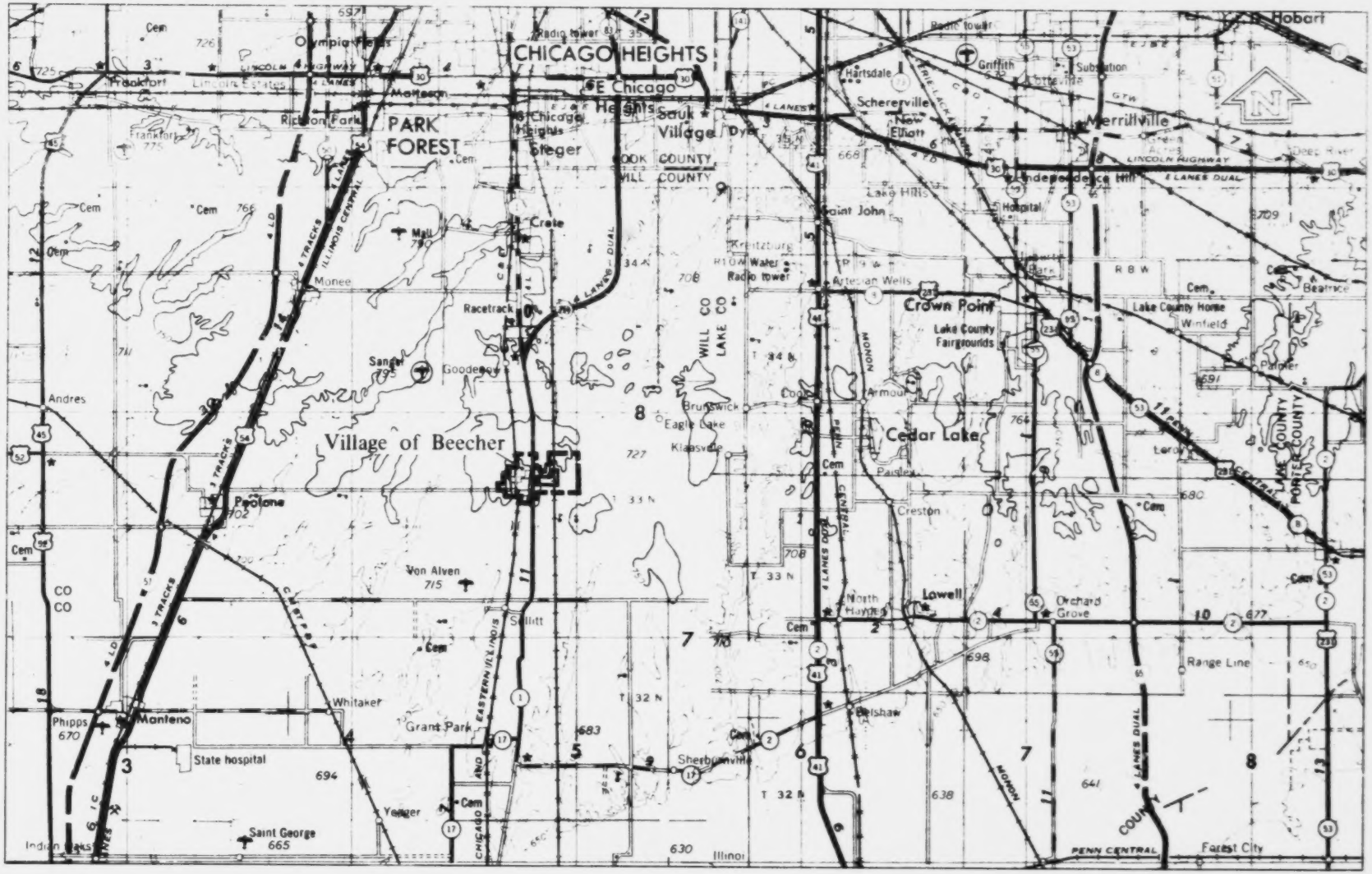

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BEECHER, IL
(WILL CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

January	23.9	May	60.6	September	65.4
February	27.3	June	70.6	October	55.0
March	37.2	July	74.2	November	40.4
April	50.5	August	72.8	December	28.0

Precipitation within the area occurs as rain, sleet, snow and hail, with average annual precipitation amounting to 34 inches. About 60 per cent of the annual rainfall occurs from April to September. The average annual precipitation by month is:

January	1.64	May	3.69	September	3.46
February	1.53	June	3.83	October	2.69
March	2.62	July	3.92	November	2.09
April	3.68	August	3.14	December	1.95

The Village of Beecher is located along both Trim Creek and Trim Creek Tributary, approximately 1-1/2 miles upstream of their confluence.

Trim Creek Tributary drains into Trim Creek with a contributing drainage area of 3.6 square miles. Trim Creek passes through the eastern portion of Beecher. Once outside the corporate limits, it continues south for 14.5 miles, draining into the Kankakee River. Development within the flood plain consists mostly of residential and agricultural areas.

2.3 Principal Flood Problems

The primary cause of flooding in the Village of Beecher is usually a combination of snowmelt and rainfall events. The only documented references to flooding are those of July 1957, December 1965 and April 1967, as shown in the Beecher Quadrangle Flood Maps (References 3 and 4). No discharge values for these floods are available.

2.4 Flood Protection Measures

The Village of Beecher has recently passed a bond issue to elevate flooding problems on the west side of the village, but the actual construction has not yet begun.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 per cent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals

or exceeds the 100-year flood (one per cent chance of annual occurrence) in any 50-year period is about 40 per cent (four in ten), and for any 90-year period, the risk increases to about 60 per cent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

For Trim Creek and Trim Creek Tributary, multiple regression analysis was used to estimate flood magnitudes at recurrence intervals of 10, 50, 100 and 500 years. The regression equations, with independent variables of drainage area, channel slope, rainfall intensity and areal factor, were developed by the U.S. Geological Survey (USGS) in cooperation with the Illinois Department of Transportation (Reference 5).

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
TRIM CREEK					
Crest-stage gage No. 05520250	20.4	696	1,032	1,174	1,493
Indiana Avenue	13.4	602	898	1,024	1,309
TRIM CREEK TRIBUTARY					
Confluence with Trim Creek	3.59	437	671	772	1,005
Indiana Avenue	1.81	304	470	542	710

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

Cross sections for the backwater analyses were determined from field surveys with some overbank portion cross sections being determined from topographic maps (References 6 and 7). The locations of the surveyed cross sections were determined by examining maps of historic flooding (References 3 and 4) in order to find areas of changing flood width. Therefore, the cross sections are representative of the actual flow conditions. Cross section locations were at close intervals above and below bridges, dams and culverts in order to compute the significant backwater effects of these structures. All bridges were surveyed to determine structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Overbank and channel roughness coefficients (Manning's "n" values) were estimated by observation of photographs taken during the field survey and by use of the USGS Water Supply Paper 1849 (Reference 8) and Supplement B of the U.S. Soil Conservation Service (SCS) National Engineering Handbook, Section Five (Reference 9). These values for Trim Creek are 0.043-0.047 for the channel and 0.070-0.073 for the overbank. For Trim Creek Tributary, the values for the channel are 0.041-0.047 and 0.066-0.070 for the overbank.

Water-surface elevations of floods of the selected recurrence intervals on all streams studied in detail were computed through the use of the U.S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 10). This program relates stream geometry characteristics and discharge to stream elevation.

The Trim Creek backwater analysis was started 2,230 feet downstream of the Missouri Pacific Railroad, using the slope-area method, and was terminated 50 feet upstream of Farm Lane bridge. Trim Creek Tributary was modeled as a fork off Trim Creek, starting at its confluence with Trim Creek and ending 50 feet upstream of Church Road bridge.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

Flood elevations can often be increased by ice jams during spring thaws or by debris clogging bridges.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using topographic maps with an original scale of 1:24000 and a contour interval of 10 feet after being enlarged to a scale of 1:6000 (References 6 and 7).

For areas of approximate flooding, the boundary of the flood plain was determined from historic records and topographic maps developed by the Northeastern Illinois Planning Commission (References 3 and 4).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood

heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. However, under Chapter 19, Section 65f, Illinois Revised Statutes of 1973, encroachment in the flood plain is limited to that which will cause only an insignificant increase in flood heights (Reference 11). Thus, at the recommendation of the Illinois Division of Water Resources, a floodway having no more than a 0.1-foot surcharge has been delineated for this study.

The floodway for this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

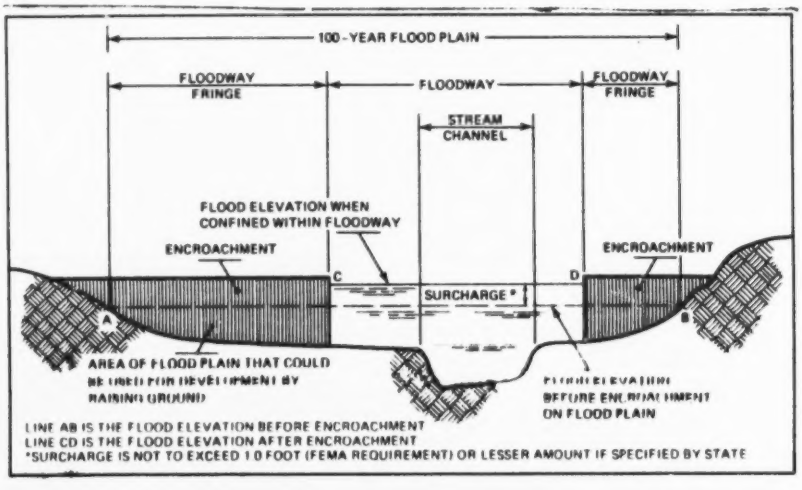
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
TRIM CREEK							
A	76,943	206	734	1.4	695.8	695.8	0.0
B	78,263	219	1485	0.7	696.0	695.9	0.1
TRIM CREEK TRIBUTARY							
A	6665[2]	30	132	4.1	703.7	703.7	0.0
B	7283[2]	14	92	5.9	705.3	705.3	0.0
C	8691[2]	160	218	2.5	709.7	709.7	0.0
D	10,791[2]	258	265	2.0	716.9	716.9	0.0
E	12,422[2]	350	535	1.0	726.2	726.1	0.1

[1]FEET ABOVE MOUTH
[2]FEET ABOVE CONFLUENCE WITH TRIM CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BEECHER, IL
(WILL CO.)

FLOODWAY DATA

TRIM CREEK - TRIM CREEK TRIBUTARY

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Village of Beecher.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 per cent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the Village of Beecher are shown on the Flood Profiles and are summarized in Table 3, "Flood Insurance Zone Data."

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Village of Beecher was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A2, A3 and A4:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of Beecher is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

A Flood Insurance Study has been completed for the unincorporated areas of Will County (Reference 12). The results of this study will agree with the Will County Study.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
TRIM CREEK							
REACH 1	0001	–1.6	–0.4	0.4	015	A3	VARIES–SEE MAP
TRIM CREEK TRIBUTARY							
REACH 1	0001	–1.9	–0.5	0.8	020	A4	VARIES–SEE MAP
REACH 2	0001	–0.8	–0.2	0.4	010	A2	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BEECHER, IL
(WILL CO.)

FLOOD INSURANCE ZONE DATA

TRIM CREEK - TRIM CREEK TRIBUTARY

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Information taken from historic records and topographic maps, which were developed by the Northeastern Illinois Planning Commission (References 3 and 4), was used for areas of approximate flooding, and agree with this Flood Insurance Study.

A Flood Hazard Boundary Map has been published for the community (Reference 13). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, (24th Floor), Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

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12. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of the County of Will, Illinois, October 15, 1981.

13. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Beecher, Illinois, April 1976.

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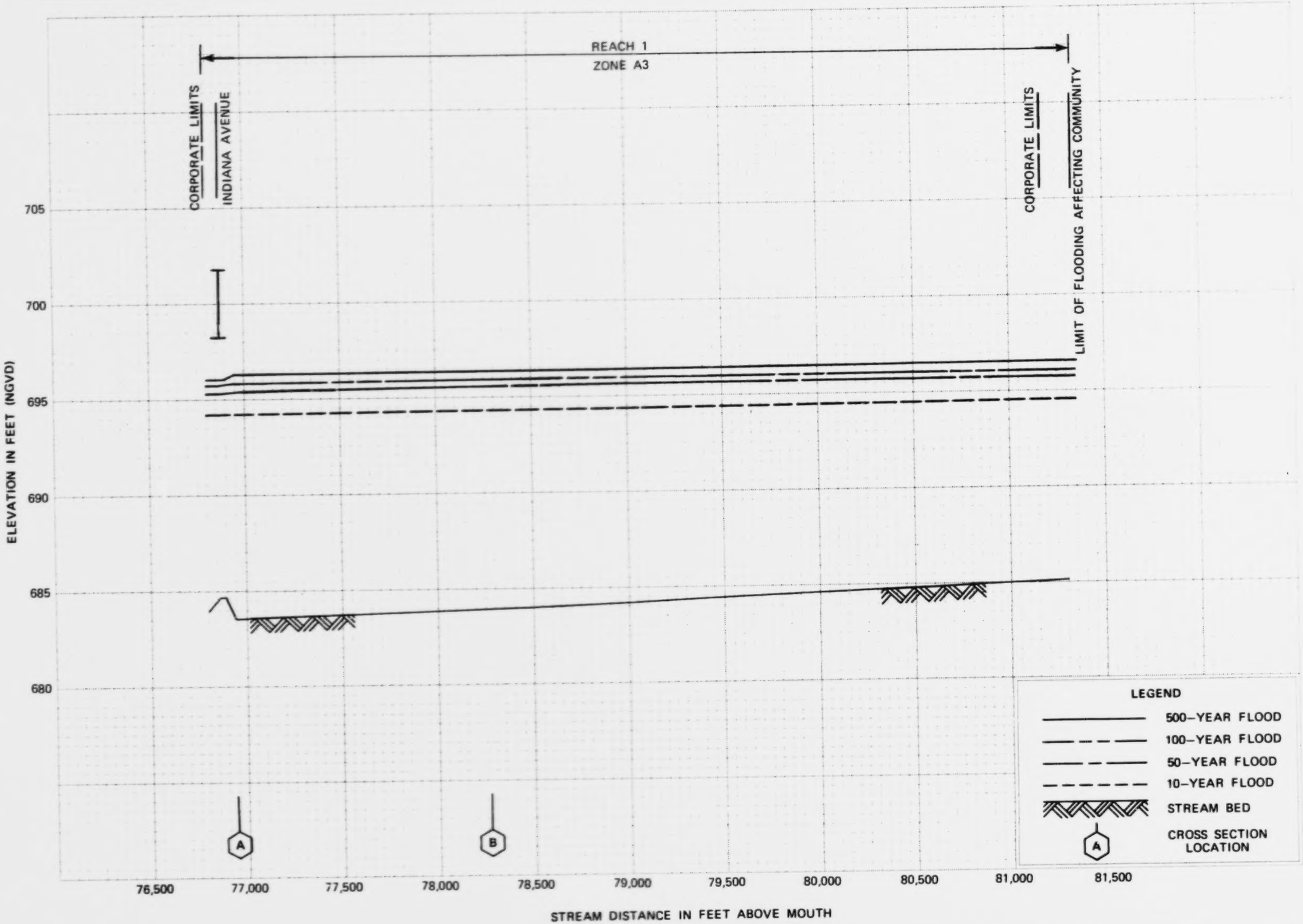


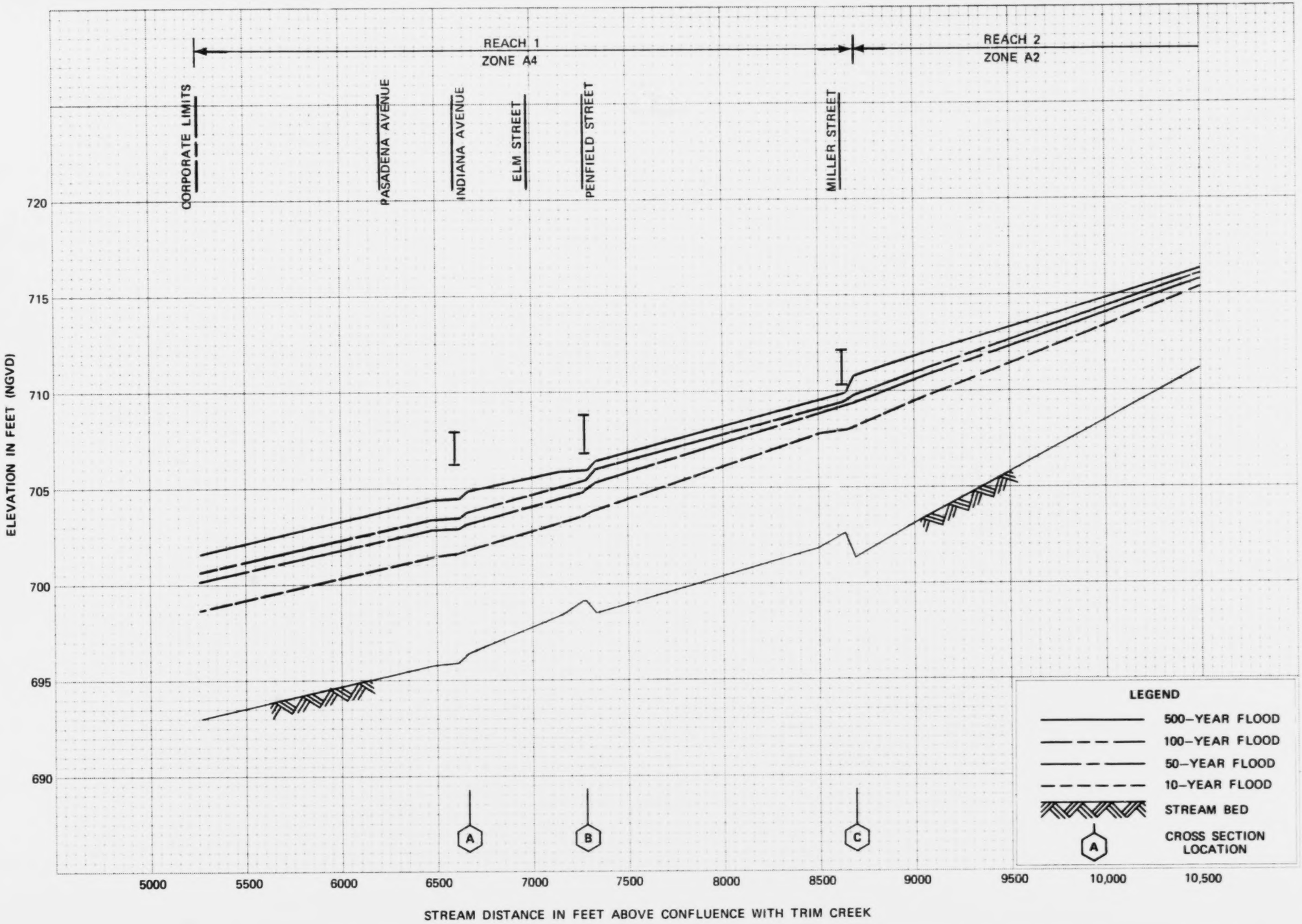
FLOOD PROFILES

TRIM CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BEECHER, IL
(WILL CO.)

01P



FLOOD PROFILES

TRIM CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BEECHER, IL
(WILL CO.)

02P

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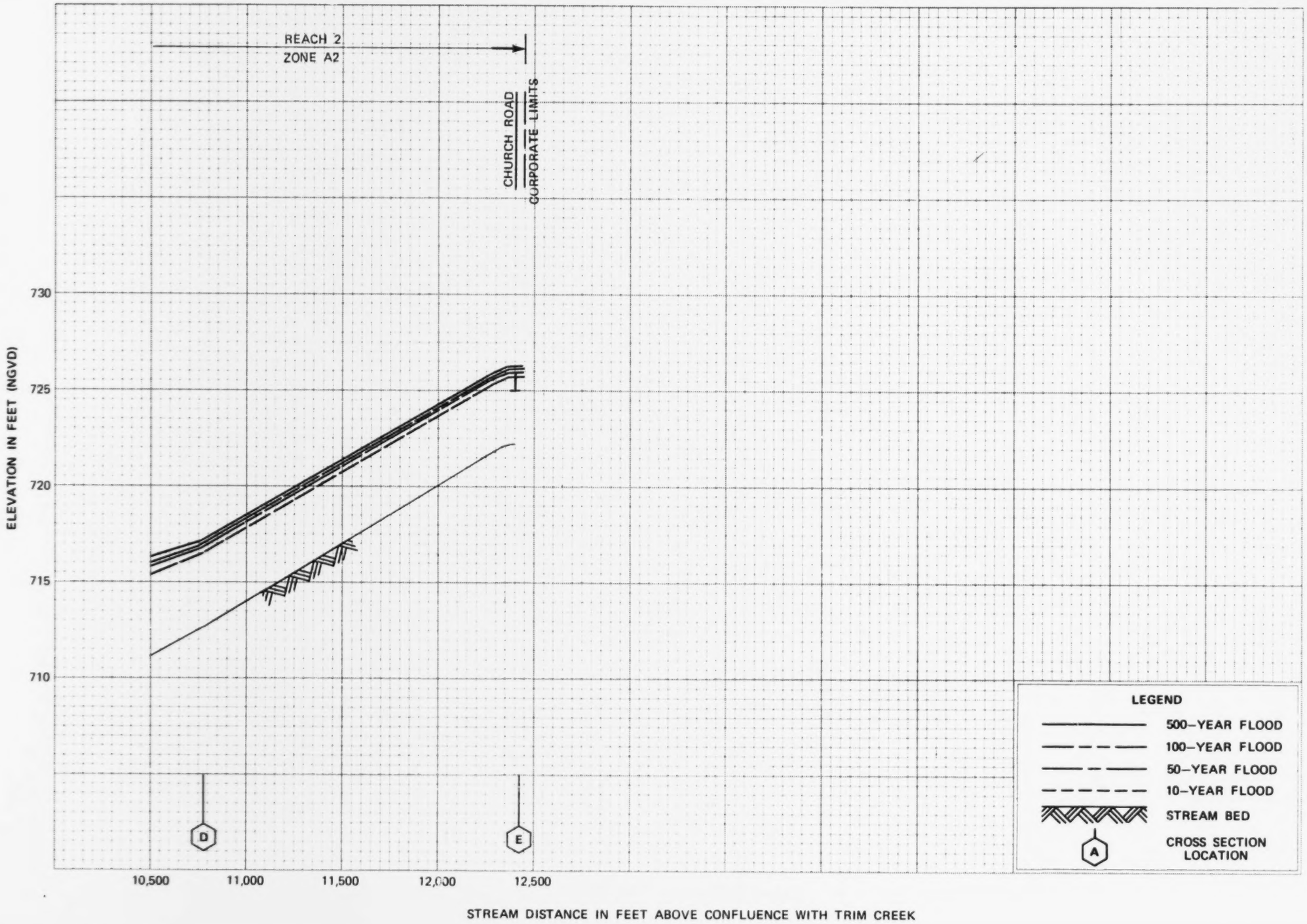

FLOOD PROFILES

TRIM CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BEECHER, IL
(WILL CO.)

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